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ABSTRACT

This paper is an empirical study of Dryer's (1980) universal hierarchy of positions of sentential complements as a predictor of second language acquisition. The place of universal grammar in second language research is discussed, as is Dryer's hierarchy and preliminary psycholinguistic evidence in support of it. The results of an experiment testing the hierarchy against the performance of second-language learners and native speakers are reported: the hierarchy predicts access to complement structures by second-language learners and native speakers (clause-final accessed more than clause-initial and access proceeds from more universal to less universal). These results are discussed as counterevidence to language interference and evidence for language universals and universals of performance. (Author)

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The Complement Hierarchy:
Evidence for Language Universals from L₂

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1. Introduction

Recently in the literature on the empirical study of language universals, there has been a tendency to test universal implicational hierarchies against the learning strategies of L₂ adults. I am referring, specifically, to the work of Susan Gass and Josh Ard (Gass, 1979, 1980, 1981; Gass and Ard, 1980) on the use of L₂ data to test the claims of relational grammar concerning the universal logic of relative clause constructions. Capitalizing on the assumptions of L₂ researchers such as Bailey, Madden, and Krashen (1974) and Burt and Dulay (1980), who claim that L₂ acquisition follows the natural logic of universal grammar, Gass and Ard have shown that Keenan and Comrie's (1977) Noun Phrase Accessibility Hierarchy (hereafter NPAH)---the universal hierarchy of relative clause formation---predicts performance by adult second-language learners in the acquisition of relative clauses. Gass' and Ard's work in testing the claims of universal grammar against L₂ learning has been so successful that they claim that L₂ may be something of a proving ground for all empirical work on language universals:

...it may be maintained that second language acquisition data are less distorted than those from first language acquisition. Thus, a better correspondence obtains between language universals and second language acquisition data than between universals and first language acquisition data. Hence second language acquisition data provide a

clearer window for the investigation and verification of language universals (Gass and Ard, 1980:451).

It is in this mode of research that the following study has been undertaken. Below are reported the results of an experiment (a sentence construction test) designed to test the claims for a universal hierarchy of sentential complementation against adult L_2 performance. It is hoped that the work reported below contributes to the growing body of data on the empirical verification of language universals.

2. The Complement Hierarchy and Preliminary Empirical Evidence

Matthew Dryer (1980) has recently argued in great detail that there is a universal hierarchy of sentential complements (i.e., structures of the form $[[_{NP} NP + VP]]$). From an analysis of a large number of genetically unrelated languages, Dryer has concluded that there is a sequencing of preferred clausal positions for sentential NP's: clause-final > clause-initial > clause-internal (where > means "is more preferable than"). Thus, all languages which have sentential complements have such structures in clause-final position, as English does: "John knows that Harry is an idiot." Fewer languages have complements in clause-initial position: English is one such language, as the sentence "That you arrived surprised me" attests. And even fewer languages have clause-internal complements: English does not have this structure, but clause-internal complements are productive structures in languages such as Hopi, Lakota, and Tamil.

An interesting feature of this hierarchy (as with other universal hierarchies) is that languages contain rules for the permutation of sentential NP's from positions of low universality, such as clause-initial, to positions of high universality, such as clause-final. Note that this explains, functionally, the existence of transformation rules such as extraposition in English since these operations basically work to promote complements one step up on the

Complement Hierarchy, from clause-initial to clause-final. Thus, the transformation (via extraposition) of "That you arrived surprised me" to "It surprised me that you arrived" is motivated by its function of creating a more universal structure.¹

Now, it is not my intention to retrace all of Dryer's arguments, which I find quite sound. Rather, I want to point out that Dryer's Complement Hierarchy is a hierarchy of naturalness analogous to other hierarchies in universal grammar (such as the NPAH, Ioup's (1975) Quantifier Hierarchy, Corbett's (1979) Agreement Hierarchy, and Cole, et al.'s (1977) Island Hierarchy). The Complement Hierarchy is a hierarchy of accessibility of sentential NP structures and is therefore amenable to empirical test in terms of ease of comprehension and frequency of production since universal hierarchies, which make naturalness claims, can be verified insofar as the structures which are claimed to be more natural ought to be more easily comprehended, more frequently produced, and acquired earlier than those structures which are less natural. That is, if universal hierarchies are valid predictors of naturalness, then any performance task---any production or comprehension of a linguistic structure on the universal hierarchy---ought to be accountable to the logic of the hierarchy.

Verification of these hierarchies in these psycholinguistic terms produces what is called intralanguage validity of the hierarchies (see Keenan, 1975), as opposed to the interlanguage validity which Dryer has provided for the Complement Hierarchy. Intralanguage validity is essentially what Keenan (1975) has given for the NPAH and what Frawley (1981a, 1981b) has given for the NPAH and other universal hierarchies. Work by Gass and Ard on universal relative clause formation strategies by L₂ learners has provided similar evidence. What remains to be done, here, is to use L₂ data to verify the naturalness of the Complement Hierarchy.

There is already a substantial body of supportive data for the Complement

Hierarchy from studies in other areas of linguistic performance, and these facts merit consideration before the L_2 study is treated. Menyuk's (1969) early study, for example, shows that objective complements precede subjective complements in the verbal productions of young children. Similarly, Limber (1973) has claimed that in the production of complex syntax by children: "Invariably, the first complements are object complements...; no subject complements appear in the speech of any child up to 3" (Limber, 1973:175). Bowerman (1973) has made the same claim: "The first complex sentences appear after sentences about four words long become common. These involve object complementation: embedded sentences functioning as nominals in the role of direct object of the verb of the matrix clause" (Bowerman, 1973:286). And Limber (1976), again, in an elaborate cataloguing of the spontaneous speech of children between the ages of two and four, found an overwhelming predominance of such object structures. Thus, it appears that evidence from the verbal productions of young children supports the logic of Dryer's hierarchy regarding the preference of clause-final complements over clause-initial ones.

Other evidence for the Complement Hierarchy can be found in studies of the receptive abilities of hearing and deaf students. Jones and Quigley (1979), in testing the performance of deaf and hearing adolescents on the Test of Syntactic Abilities, found that both recognition and comprehension of sentential complements in object position were significantly better for both groups of subjects than for recognition and comprehension of subject sentential complements. And this result held true even for extraposed complements, or structures which are more complicated transformationally. In short, Jones and Quigley state that "the findings did generally indicate that that-complements in object position were easier than that-complements in subject position" (Jones and Quigley, 1979:29), or, more pertinently, that the naturalness of clause-final complements over clause-initial ones was

borne out through ease of comprehension.

Finally, more evidence for the validity of Dryer's hierarchy comes from data on written language production. Quigley, Wilbur, and Montanelli (1976) found that in written language by hearing and deaf subjects, thirty-five percent of the samples of writing had at least one object complement, but there were no instances of subject complements in any of the pieces of prose. And Frawley (1981a) has found that Dryer's hierarchy predicts differences in complement usage by good and bad writers such that bad writers employ the more natural complements to a greater extent than do good writers, or, in short, that the Complement Hierarchy is a predictor of differential written syntactic performance.

There is ample reason to think, therefore, that the Complement Hierarchy will be a predictor of access to complements by second-language learners. In particular, L_2 learners ought to access clause-final complements better than clause-initial ones since clause-final complements are the more natural. There also ought to be differences in access for each type of complement between L_2 learners and native speakers, and an increase in level of proficiency in the language ought to correlate positively with access to less natural structures.

3. Experimentation

3.1 Design and Method

In order to test Dryer's Complement Hierarchy against L_2 evidence, a sentence construction task was designed and administered to native speakers of English and adult learners of English as a second language. It was assumed that a sentence construction task would be the most reliable measure of acquisition since it is a production task; with comprehension exceeding production

in language learning, production data are more illustrative of what has been acquired.²

In the task, subjects were given a packet of twenty-four cards. Twelve cards contained one word, a predicate which could take either a subjective or objective complement. For example, "surprise" is such a predicate: it is possible to say either "That he came surprised me" or "It surprised me that he came." Twelve cards contained a sentential complement, such as "that the woman likes the man." Only sentential complements marked by "that" were used since there is evidence that "that-complements" are easiest for L₂ learners (see Butoyi, 1979). Length and complexity of vocabulary for each type of card were controlled, as was the semantics of each complement so that no complement logically/semantically demanded any predicate: i.e., complements such as "that John saw a Martian" were ruled out since they would be automatically preferred for linkage with a particular predicate, such as "surprise." Subjects were instructed to choose one of each type of card from the packet and to combine the two into one grammatical sentence, thus providing twelve grammatical sentences in total for each subject. The cards in the packet were completely randomized so as not to bias response toward either clause-initial or clause-final placement of the complement. Subjects were further instructed that they could change the predicate (referred to as "the one-word card") in any manner, but could not change the complement (referred to as "the card with several words"). Subjects were asked to write the grammatical sentences which they constructed and not to re-use any cards. Beyond these conditions, no further restrictions were placed on subject performance.

3.2 Subjects

Subjects were twenty native speakers of English, ten Advanced-level learners of English as a second language, and ten Intermediate-level learners

of English as a second language. The native speakers ranged in age from eighteen to fifty and in education level from college freshman to Ph.D. The L₂ learners had analogous age and educational-level ranges, and they were native speakers of the following languages: Arabic, Indonesian, Chinese, Spanish, and Portuguese. Subjects also served as informants on the complement structures in their native languages, and it was found that Arabic, Indonesian, and Chinese have both clause-final and clause-initial complements; that Spanish has basically only clause-final complements (since subjects disagreed violently over the grammaticality of clause-initial complements³); that Portuguese has only clause-final complements; and that no native language of the subjects has clause-internal complements.

L₂ subjects were considered Advanced or Intermediate by virtue of their placement in such groups at the University of Delaware's English Language Institute. That all subjects could comprehend and produce both clause-final and clause-initial complements was ascertained through consultation of their current English materials.

3.3 Results and Discussion

Below are summarized the results of the sentence construction task; figures indicate total number of structures produced:

Insert Table 1 Here

These data support the claim of the Complement Hierarchy as a predictor of access to complements according to the universal logic of complementation. The graphed data reveal the trends nicely:

Insert Figure 1 Here

Note that there is a monotonic decline for all groups in production of sentential complement types according to the hierarchy of complementation set up

by Dryer. Clause-final complements are by far the most productive structures for all groups, supporting the claim that the most universal structures are also the most easily accessible. The fact that this is true for native speakers suggests that the hierarchy has intralanguage validity: within English, clause-final complements are the most natural; the fact that this is also true for L_2 learners suggests that the complement hierarchy has validity as a predictor of L_2 access likewise. It is interesting to note, further, that there is no significant difference across the three groups for the frequency of production of clause-final complements. Advanced L_2 learners and Intermediate L_2 learners do not differ significantly ($t = -2.89$; n.s.), and L_2 learners as a group (with the grouping of L_2 subjects justified by the non-significant t) do not differ significantly from native speakers in the production of clause-final complements ($t = -15.59$; n.s.). What this means is that for all speakers, clause-final complements are the most accessible, or, in other words, that L_2 learners and native speakers perform alike on this particular syntactic structure. This is in line with the expected trend since the most universal structure ought to have the least variability in access.

Performance on clause-initial complements reveals some curious tendencies. Clause-initial complements are less accessible than clause-final ones for both L_2 learners and native speakers, which lends support to the prediction of the complement hierarchy that less universal structures are more difficult to access. Interestingly enough, for this syntactic structure, there are significant differences across the groups for access. Advanced L_2 learners and Intermediate L_2 learners differ significantly in their performance ($t = 2.78$; $.01 < p < .02$); native speakers differ significantly in their access from Advanced L_2 learners ($t = 1.51$; $.1 < p < .5$); native speakers differ significantly in their access from Intermediate L_2 learners ($t = 3.31$; $.01 < p < .02$). This is the expected trend since the reasonable assumption is that less universal structures ought to be subject to more variability in access. That is, less

universal structures, being more psychologically difficult, ought to be accessed differentially because of this difficulty, which is not true for the more universal clause-final complements, which are accessed with equal ease by all groups.

Finally, there are no instances of clause-internal complements in the data. This is expected since there are no clause-internal complements in English or in the native languages of the L_2 subjects. One could, of course, claim that the absence of clause-internal complements is also predicted by the hierarchy since those are the least universal, but that would be question begging; it is enough to note that the absence of clause-internal complements is at least in line with the tendencies predicted by the Complement Hierarchy.

Now, we have seen thus far that the universal logic of the Complement Hierarchy predicts access to sentential complements. The question remains of how good a predictor of access it is. For this, we need to look at the correlations of production of sentential complements and level of proficiency in English. That is, it is reasonable to surmise that as proficiency in English increases, so does access to less universal structures since proficiency in the language entails control over the variation on syntactic structures permitted in the language.

The correlation between level of proficiency in English and production of clause-final complements is quite revealing on this point. There is a positive correlation between increase of proficiency in English for L_2 learners and production of clause-initial complements ($r = .66$). Thus, as more of the target language is acquired, access to less universal structures increases. The same is true, coincidentally, for native speakers, whose level of education in English (from college freshman to Ph.D.)⁴ correlates positively with production of clause-initial complements ($r = .96$): this is a finding that is in line with Frawley's (1981a) earlier findings about increase in literacy skills

and access to less universal syntactic structures. In short, access to less universal structures is related to level of language proficiency.

The same is not true, however, for clause-final complements. Level of proficiency in English for L_2 learners and production of clause-final complements correlate negatively ($r = -.25$); level of education in English for native speakers and production of clause-final complements also correlate negatively ($r = -.86$). What this means is that more universal structures are accessed with less frequency as the level of proficiency in language increases, which supports the claim that language-learning is a bottom-up procedure from the most universal to the less universal: the more proficient in the language, the less reliant on universal structures.

4. Conclusion: Some Possible Objections and Speculations

It seems quite clear, then, that the logic of the Complement Hierarchy is the logic of access to complement structures by L_2 learners and native speakers. It might be countered, however, that the performance by the L_2 learners on this task is a function of interference of the native language on the acquisition of the target language since the native languages of the L_2 subjects predominate in clause-final complements over clause-initial ones. There are two responses to this objection.

The first response may seem rather peculiar, but it deserves mention: even if the results are caused by language interference, this supports the universalist claim. Since the Complement Hierarchy is a claim about the similarity of all languages, then there is no interference at all, except in the trivial sense that all languages are alike on some level. That is, one could respond to the interference question by saying that it is not a question at all since all languages are basically the same. But this borders on rather

circular argumentation and is disproven, *prima facie*, by the mass of existing data on real interference problems. Of course, the universalist could respond, here, by arguing that even interference is predicted by the logic of universal grammar, but this would seem to make the task of describing universal grammar, and interference predicted by it, an almost endless task. Nonetheless, the possibility of reducing interference to the logic of universal grammar remains a viable alternative for the universalist.

The second response to the problem of interference is stronger, however. In the data discussed above, ten of the twelve clause-initial complements produced by the L_2 subjects were produced by individuals who did not have productive clause-initial complements in their native languages. These structures were produced by the speakers of Spanish and Portuguese. It is impossible for interference to account for this since interference could not have operated here. Furthermore, in places where interference could have accounted for the production of some of the clause-initial complements, interference manifestly did not occur. Recall (note 3) that for some Spanish speakers, clause-initial complements are acceptable provided that they are fronted object complements which leave behind an object pronoun trace. Two structures of this sort were recorded in the data:

1. That the man likes the woman, he knows it.
2. That the dog chased the cat, the man thought it was strange.

Interestingly enough, these two sentences were not produced by native Spanish speakers, as would be expected if interference were operating; they were produced by native speakers of Chinese. But it might be countered, here, that this production of clause-initial complements by Chinese speakers is an example of interference since Chinese has clause-initial complements, and this point might be conceded, but this still does not explain why speakers of languages with clause-initial complements produced almost exclusively clause-final complements on the task.

To summarize: in places where interference should be expected, interference did not occur. L_2 subjects with only clause-final complements in their native languages

produced the most clause-initial complements; L_2 subjects with clause-initial complements in their native languages produced, almost exclusively, clause-final complements. It appears, then, that the logic of the Complement Hierarchy is a more reasonable candidate for explaining subjects' performance than is language interference.⁵

A final objection to the universalist program reported here, and perhaps the most serious objection, is one which questions all such universalist studies about the testability of competence: i.e., about testing the universal intensional structures which humans use to order input. Researchers such as Hatch (1980) and Moerk (1980; 1981) have shown that much of what is acquired in language is a function of the input into the learner, not a function of the logic of universal grammar. Hatch has put the objection quite eloquently in her discussion of the predominance of models of first-language acquisition in the work done on second-language acquisition:

First language learning is a creative construction process (first language learners were seen as exposed to almost unlimited variability of language from which their built-in, innate LAD (language acquisition device) automatically abstracted rules, thus creating the language anew). If a 'natural order' could be found in second language acquisition (or accuracy), then that order was a reflection of the LAD at work (since second language learners in natural learning environments were also thought to be exposed to an unrestricted variety of input data).

... Yet, in our child L_2 data, it seemed fairly obvious that the observed orders could easily be reflections of the input to the learner (Hatch, 1980:179).

Thus, all studies which purport to verify universal competence actually overlook input and verify nothing at all except the researchers' idealizations. My own study reported here seems particularly susceptible to this objection: though I know of no frequency studies of complement structures, it does seem intuitively correct that clause-final complements are more frequent in spoken and written input than clause-initial complements. Thus, it could be objected that my own

study has proven only that L_2 learners and native speakers access what they have been taught (input/performance), not what they universally know (competence) when they approach a task such as this, and the whole question of universals goes down the drain.

To this objection, one must ask the following: if learning is a function of input, not of universal intensional structures, why does the input have the order it does? That is, if, as Moerk (1980; 1981) has shown, the order of acquisition of grammatical morphemes by Brown's subjects correlates positively with the order of the frequency of the input into the subjects, then why is the input so orderly? Hatch, herself, is sensitive to this question: "We began to see that the child first language learner was not exposed to an infinite amount of language material" (Hatch, 1980:179). But she does not take the problem far enough. I suggest that orderly input contributes to orderly acquisition because input---that is, performance---is predictably derivative of competence. Researchers such as Cedergren and Sankoff (1974) have shown (to use their words) that performance can be a statistical reflection of competence, and therefore the frequencies of performance are accountable to rather systematic probabilities (and order of acquisition is accountable to the same probability). Thus, input has a given statistical order. This explanation is particularly useful in my own study and in all studies which rely on relational grammar for their theoretical underpinnings. The hierarchies of relational grammar are probabilistic claims, not categorical ones, and are therefore really performance claims. Dryer's hierarchy, for example, simply says that one structure is more likely than another, and the psychological implication of this is that one structure is more likely to be accessed than another. Dryer says, in fact, that the Complement Hierarchy "expresses a generalization that is reflected both in performance and in competence" (Dryer, 1980:176); Keenan (1975) makes a similar performance claim for the Noun Phrase Accessibility Hierarchy. It appears, then, that the universal hierarchies are claims about what humans are likely to do, not what they must

produce, and insofar as input is a consequence of the vicissitudes of production, input is therefore accountable to the hierarchies as performances, and acquisition, if it is also a function of performance/input, is accountable likewise.⁶ The usefulness of the universals of relational grammar is that performance---realia---can be understood in terms of them, and if language learning turns out to be a function of performance, then experiments designed to test learning in terms of performance universals are on solid theoretical ground from the start.

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NOTES

¹Dryer argues that such transformations are motivated by their reduction of center-embedding. Keenan and Comrie (1977) give other functional explanations of transformations in their work on relativization and universals.

²It must be admitted, here, that it is very difficult to know exactly when some linguistic structure has been acquired. Production as an indication of acquisition may be misleading: appropriateness of an utterance in context may be the best indicator of acquisition. But for the purposes of a decontextualized task such as the one reported here, production seems the best method of testing acquisition.

³The only acceptable clause-initial complements for Spanish speakers, though there was still great disagreement over this, were clause-initial complements derived from fronted object complements leaving behind an object pronoun trace.

⁴I assume here that acquisition of a target language and education in the native language are similar: they are both the acquisition of verbal strategies. That this is true for L₂ is obvious; that this is true for education in the native language is substantiated by the growing body of information on the literate bias of schooling (see Olson, 1977; Frawley, 1981c).

⁵It might also be pointed out that if the Complement Hierarchy embodies the universal logic of complementation, then one assumption of transformational theory is called into question: namely, that many clause-final complements are derived from clause-initial ones via extraposition and the like. The data above show that clause-final complements are basic.

⁶Furthermore, if one views universal grammar as probabilistic and considers the findings of this study as claims about access (i.e., strategies for complementation), then universal grammar meets the standard objection that it is concerned with product more than process. Universal hierarchies are claims about procedure (i.e., strategies for relativization, strategies for quantification, etc.), not about end-products.

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Group	Clause-Final		Clause-Initial		Clause-Internal	
	#	Mean	#	Mean	#	Mean
Native Speakers	199	9.95	41	2.05	0	0
Advanced L ₂ *	105	10.50	11	1.10	0	0
Intermediate L ₂ **	116	11.60	1	.10	0	0

* Four sentences were discarded because of ungrammaticality.

** Three sentences were discarded because of ungrammaticality.

Table 1: Number of complement types produced by native speakers and L₂ learners

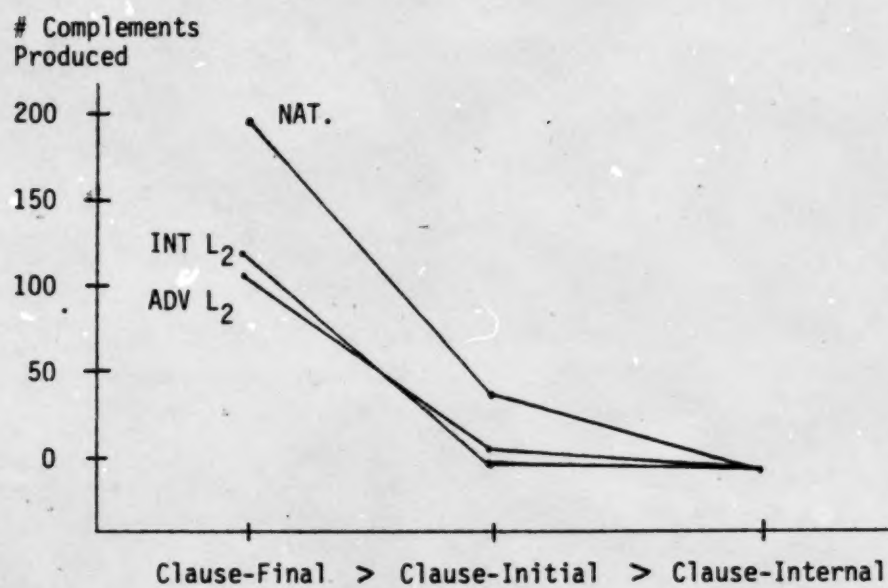


Figure 1: Distribution of complement types produced according to the Complement Hierarchy